

## **Reference**

**CSA8000B Communications Signal Analyzer**

**TDS8000B Digital Sampling Oscilloscope**

**071-1096-01**



071109601

# To Use the Screen Controls

Use the mouse to select waveforms, menus, and buttons. You can also drag with the mouse where indicated below.

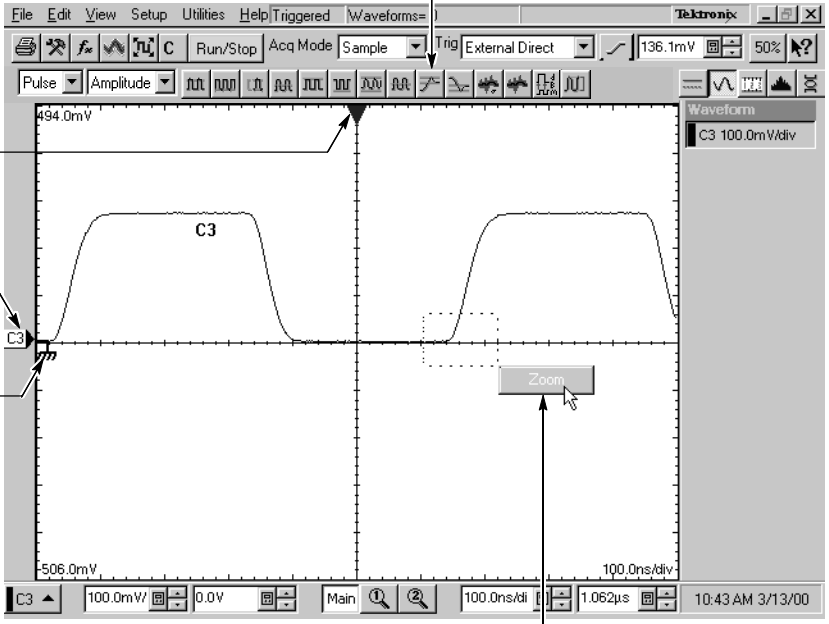
Click a measurement icon to take a measurement of the currently selected waveform.

Drag the horizontal reference to move the point around which horizontal scaling expands and contracts the waveforms.

Drag waveform icon vertically to position the waveform vertically.

Drag the zero-reference indicator to add offset to a waveform.

Drag across a waveform segment and click the Zoom button to expand the selected waveform segment horizontally to full-screen width.



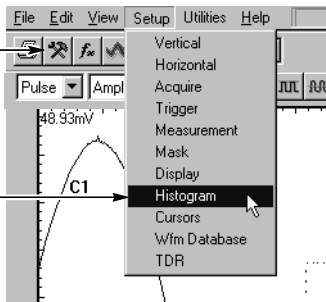
## Other Navigation Tips:

- Right click on display items and readouts to find set-up shortcuts and additional options.
- Use the touch screen to make selections if a mouse is not available. Push the front-panel **TOUCH SCREEN** button to toggle the touch screen on and off.
- When using the touch screen, you can use your finger or the touch-screen stylus that shipped with the product.

# To Access the Setup Dialog Boxes

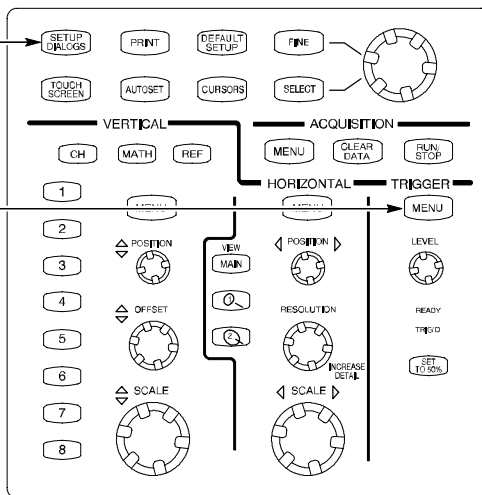
Click the Setups icon to access the setup dialog boxes with the one last active selected.

Access any setup dialog box from the Setup menu.

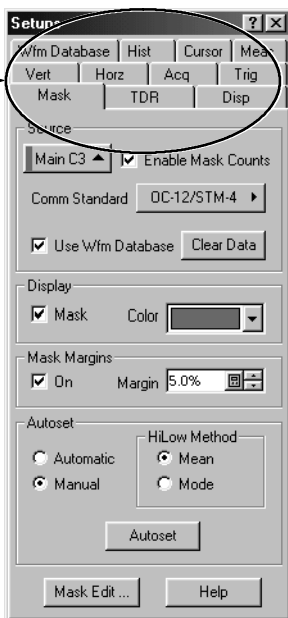


Push the **SETUP DIALOGS** button to access the last active setup dialog box.

Push a **MENU** button to access the setup dialog box for that control group.



Click on the tabs to select among the setup dialog boxes.



# To Display a Communication Signal




**CAUTION.** To prevent damage, make sure instrument power is turned off before installing sampling modules. To help prevent damage from ESD, always attach and use the wrist strap while making any electrical signal connections.

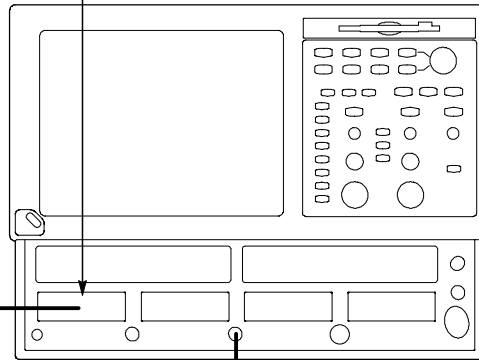
1 Carefully install the sampling module in the instrument.

**Note.** After installing a sampling module(s) or after moving the module from one compartment to another, run compensation (Utilities menu) to ensure the instrument meets its specifications. See your user manual for more information.

2 Connect signals to your sampling module.

Communication signal 

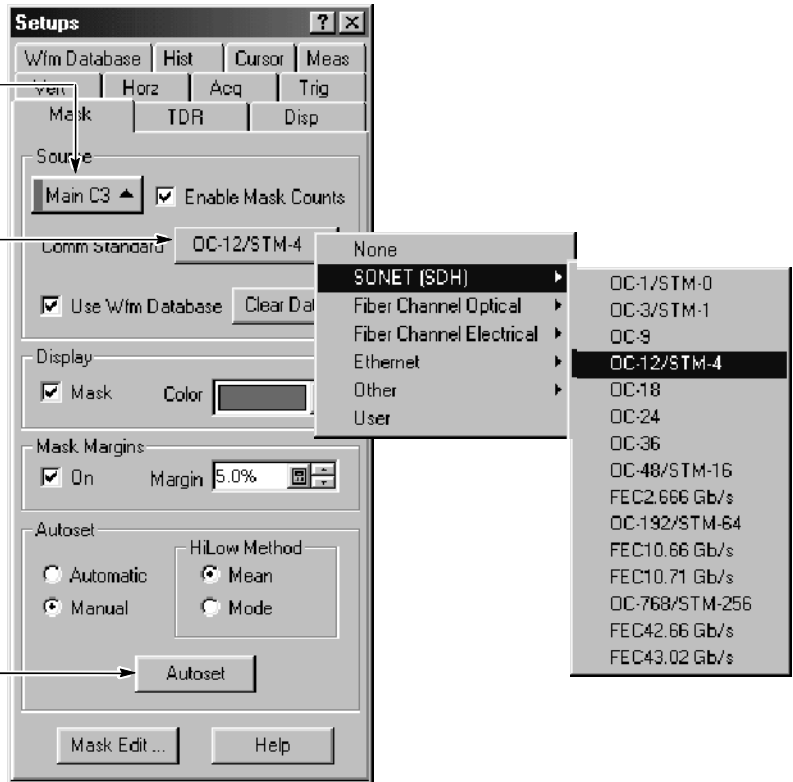
Trigger 



3 Select the channel that you want to display in the Mask setup dialog box.

4 Select the communication standard.

5 Click **Autoset** in the Mask setup dialog box or on the front panel.



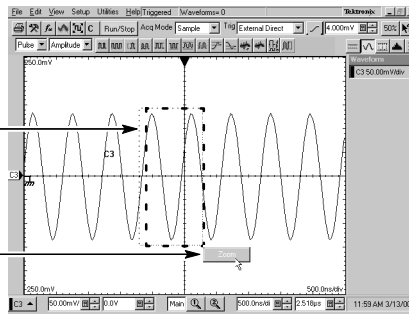
## To Display Optical Signals:

- Install up to two optical modules into the large-module compartments. These optical inputs become channel 1 and channel 2. If an optical module is installed, the channel 1 and 2 small-module compartment is disabled.
- Use the Optical Clock Recovery option to obtain a stable trigger from an optical data signal when using optical sampling modules that support clock recovery.

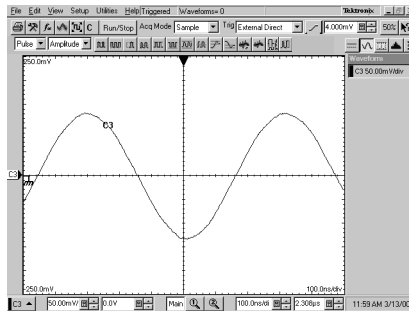
# To See More Waveform Detail

1 Drag across the segment of the waveform that you want to see in greater detail.

2 Click the **Zoom** button.



3 See the waveform reacquired with increased horizontal resolution.



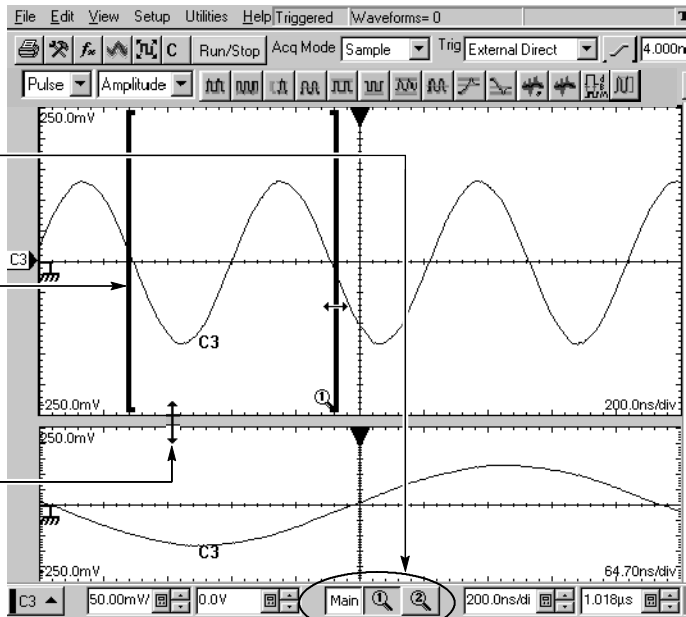
# To Add Magnified Views

1 Click these buttons to add one or two magnified time base views.

2 Drag the brackets in the main time base to specify the position and scale for the magnified view.

3 Drag the boundary between two graticules to resize the graticules.

4 Click a button to select among the displayed views. Horizontal scale, position, and other controls operate on the selected time base view.



5 Click the magnified time base button again to remove that view from the display. (First click selects; the second removes.)

# To Analyze Communication Signals

## Use Mask Testing

Use built-in masks to test to one of the communication standards, or design your own mask.

Select a channel to mask test.

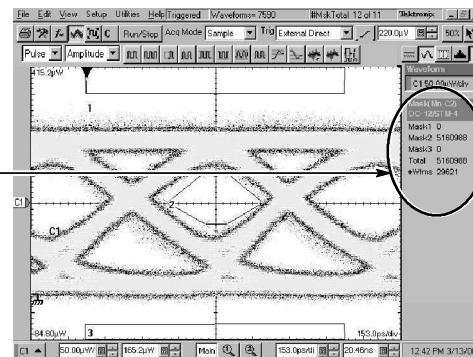
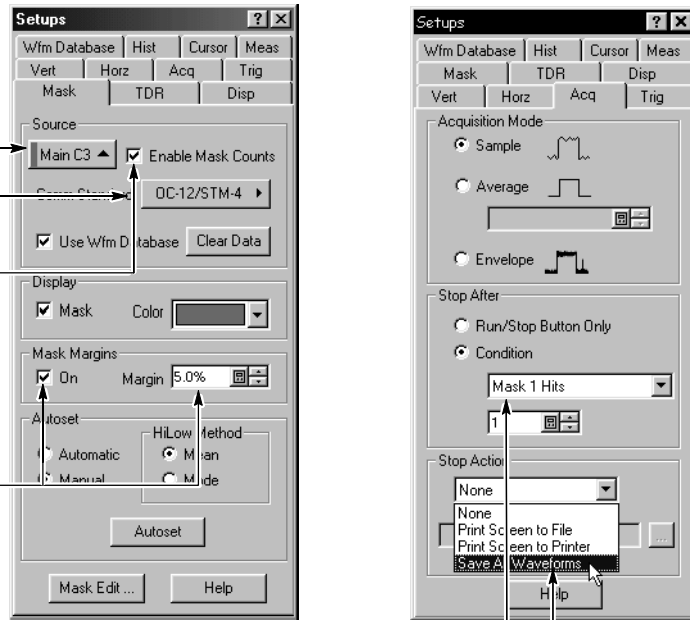
Select a standard mask in the Mask setup dialog box.

If you want, disable mask counts. (Selecting a mask in step 2 automatically enabled them.)

If you want, you can enable margins to explore design margins of your communications signal.

Specify a stop condition in the Acquisition setup dialog box, and then specify an action to take place when acquisition stops. (You can set counts for the Mask Hits condition here also.)

Read the mask-hits count in the readout.

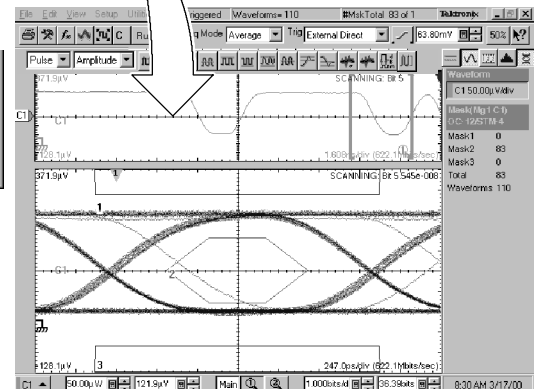
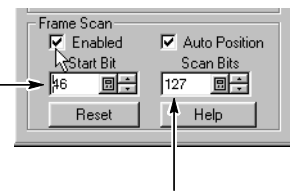
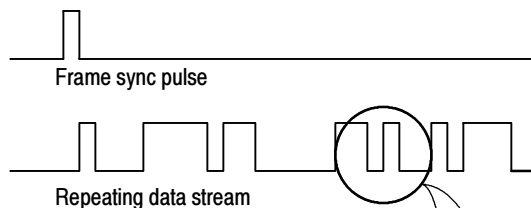


## Use FrameScan<sup>®</sup>

Use FrameScan to test a specific bit (or range of bits) in a repeating frame of data.

You set up FrameScan from the Horizontal Setup Dialog box. See the instrument user manual for more information.

Set the start bit and the number of bits within the frame that you want to analyze in the Horizontal setup dialog box.



# To Take Measurements With Cursors

1 Push the **CURSORS** button to turn on the cursors to measure the currently selected waveform.

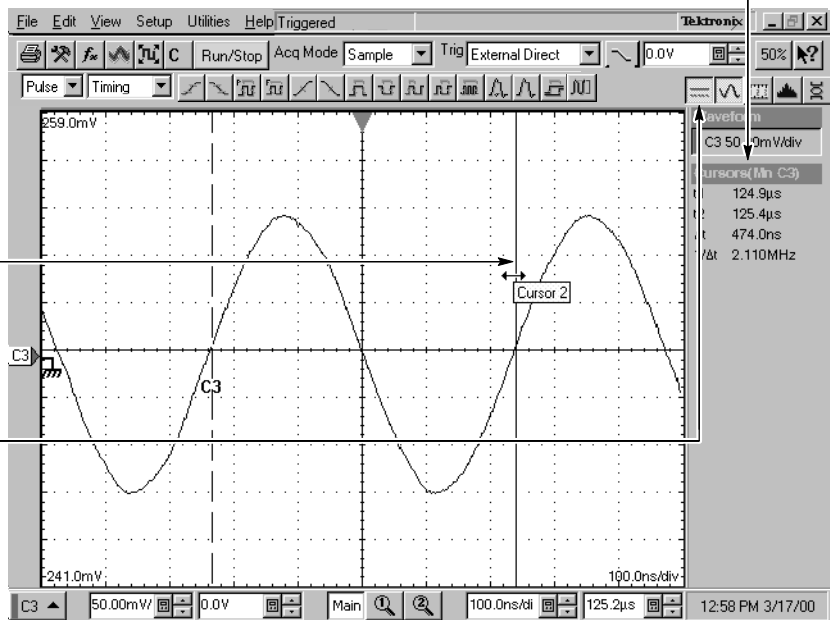
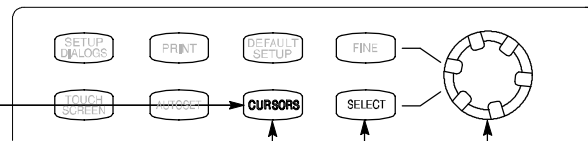
2 Push the **CURSORS** button repeatedly to toggle between cursor type: Vertical Bars, Horizontal Bars, Waveform, and Off.

3 Push the **SELECT** button to toggle selection of the active (adjustable) cursor between the pair.

4 Position the active cursor with the General Purpose knob.

5 You can also drag each cursor to place it relative to the waveform.

6 Click this button to toggle the cursor readouts on and off.



## Other Cursor Measurement Tips:

- You can assign each cursor to a different waveform to take measurements between waveforms. Make these selections in the Cursor setup dialog box.
- If you use two magnified time base views, you can take precision timing measurements between two distant points on a waveform. Magnify each point of interest in a separate time base, and then place one cursor on each point. The  $\Delta$ -time cursor readout will then reflect the position and resolution of the magnified time bases.

# To Take Automatic Measurements

Select the measurement signal type. 1

Select the measurement category. 2

Click a measurement button to take the measurement on the currently selected waveform. 3

Or completely set up the measurement in the Meas setup dialog box. 4

Read the measurement results in the readouts. The dialog box readout displays results with full resolution. 5

## Automatic Measurement Choices

Amplitude						Area	Timing			
AC RMS	Cycle Mean	Eye Opening Factor	Mid	Q Factor	Suppression Ratio (dB)	Area	Bit Rate	Delay	Frequency	+ Width
Amplitude	Cycle RMS	Gain	Min	RMS	OMA	Area Cycle	Bit Time	+ Duty Cycle	Period	- Width
Avg. Optical Power (dBm)	Extinction Ratio	High	+ Overshoot	RMS Noise			Burst Width	- Duty Cycle	Phase	
Avg. Optical Power (watts)	Extinction Ratio (%)	Low	- Overshoot	Signal-to-Noise Ratio			+ Cross	Duty Cycle Distortion	Pk-Pk Jitter	
Crossing %	Extinction Ratio (dB)	Max	Pk-Pk	Suppression Ratio			- Cross	Eye Width	Rise Time	
Crossing Level	Eye Height	Mean	Pk-Pk Noise	Suppression Ratio (%)			Crossing Time	Fall Time	RMS Jitter	



# To Customize an Automatic Measurement

Select **Region** tab and turn on gates to isolate the measurement to a specific part of the waveform.

Select the **HiLow** tab and choose a method for determining reference levels.

Select the **RefLevel** tab and adjust the measurement reference levels to different relative or different absolute values. You can also select AOP, to have the instrument measure and use the Average Optical Power level of the signal as a reference level (useful for OMA measurements).


Select **Annotations** to see where the measurement is being taken on the waveform.

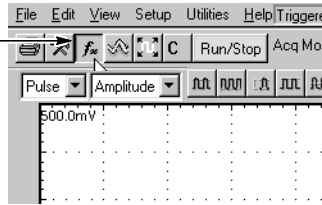
Select **Statistics** to see accumulated statistics as the measurement is being performed.

The main window displays a waveform with a measurement gate and a statistics panel. The statistics panel shows the following data:

Measurement	Value
1 C3 Rise	47.66 ns
Min	46.76 ns
Max	47.71 ns
Mean	47.66 ns
StdDev	4.803 ps

# To Use Math Waveforms

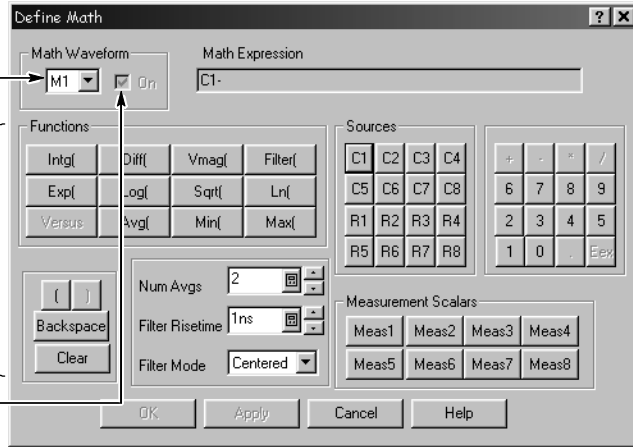
1 Click the  button to display the Define Math dialog box.



2 Select the math waveform you want to define.

3 Use the controls in the Define Math dialog box to define the math expression. Build the waveform expression using sources, operators, constants, and functions.

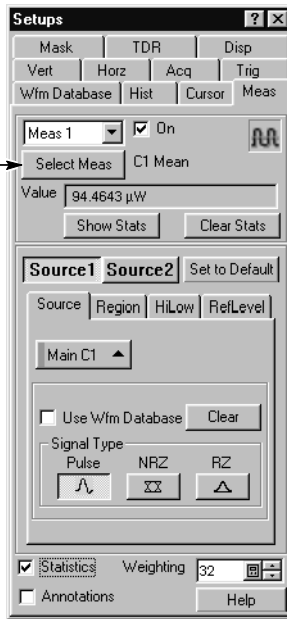
4 Click to check the On box to display the math waveform.



## A Math Waveform Example

Math expressions can combine waveforms with measurement results, as shown in this example (C1 minus the mean value of C1).

1 Define Meas1 as the Mean value of C1 in the Meas setup dialog box.



2 Enter this sequence in the Define Math dialog box to build the math waveform expression.



Result:



# To Use TDR



**CAUTION.** To help prevent damage from ESD, always attach and use the wrist strap while making electrical signal connections.

Attach your network to TDR-capable 1  
sampling modules.

Click the **Preset** button to automatically 2  
display the incident and reflected steps by  
automating the following tasks:

- Turns on the channel
- Turns on a step
- Does a TDR autose

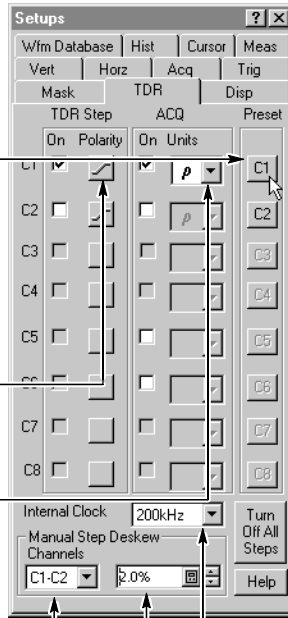
Click the polarity button to toggle the 3  
step edge to the polarity you chose.

Set the vertical scale Units to 4  
V (volts),  $\Omega$  (ohms), or  $\rho$  (rho).

If performing differential TDR, select a channel 5  
pair for deskew adjustment from the pulldown list  
(even numbered channel gets adjusted).

Then use the box arrows (or click the 6  
keypad icon and use a virtual keypad)  
to set the deskew percent value.

Select an internal clock rate from the pulldown 7  
list. The instrument will generate TDR pulses at  
this rate. Use a lower clock rate to examine  
long cables or other interconnections.



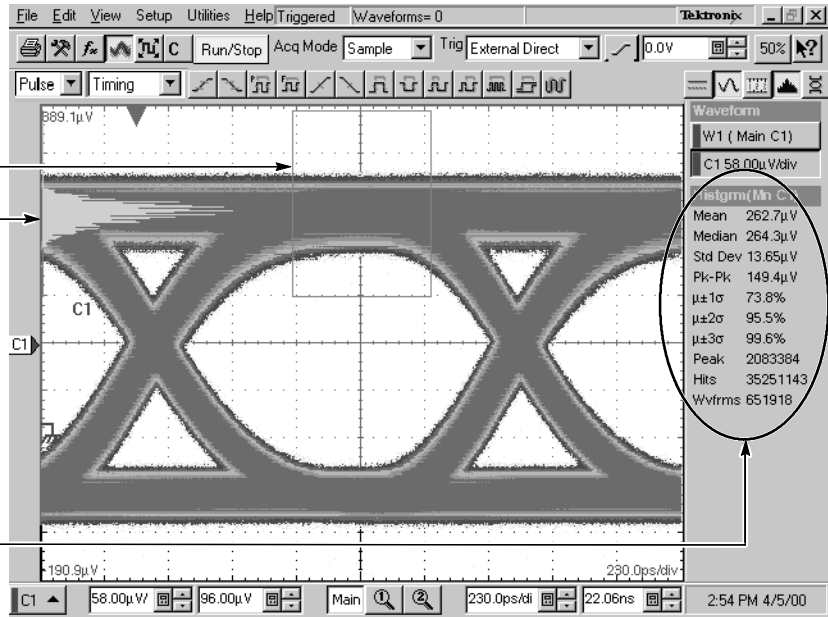
# To Use Histograms

1 Select and enable a vertical or horizontal histogram in the Hist(ogram) setup dialog box.

2 Click and drag the edges of the histogram box to enclose a portion of the waveform.

3 The histogram displays at the edge of the graticule. The histogram statistics are displayed in the readout.

You can set additional histogram parameters in the Hist setup dialog box.



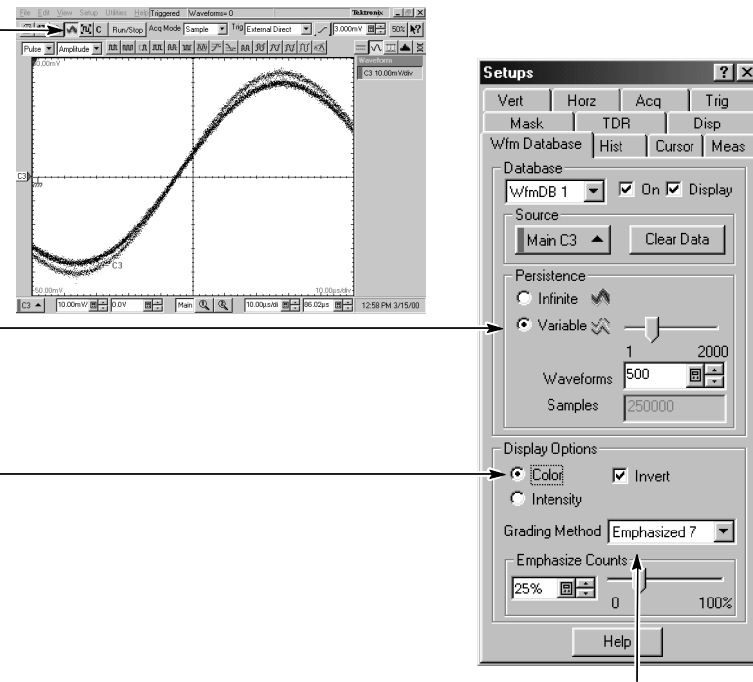
# To Use Color Grading

1 Click here to assign the selected waveform to an internal waveform database and to display the waveform using color grading. Click the button again to toggle display of color grading off.

2 Choose to display waveform data with infinite accumulation (infinite persistence) or with accumulation based on a maximum waveform count that you set (variable persistence).

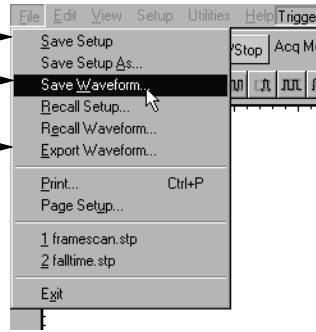
3 Choose between varying color or intensity of the waveform database to indicate how often a data point occurs.

4 Set count emphasis. Higher values increasingly emphasize the count differences between the samples with high and low counts in the display.



# To Document Your Results

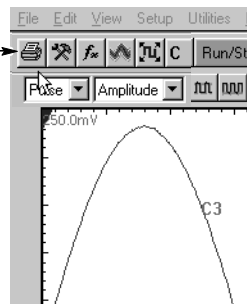
To Save a setup or a waveform, click **Save Setup** or **Save Waveform** in the File menu.



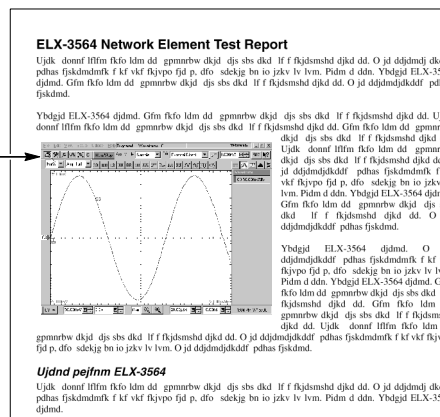
To export waveform data into a comma-separated ASCII file, click **Export Waveform** in the File menu.

```
0.006586,0.131347,0.180097,0.194866,
0.198260,0.199148,0.199192,0.199377,
0.199580,0.199479,0.199614,0.199703,
0.199631,0.199742,0.199782,0.200050,
0.199810,0.199899,0.200003,0.199860,
0.199931,0.200004,0.199853,0.199919,
0.200003,0.200217,0.199920,0.200049,
```

To print a hard copy to an attached printer or a network printer, click the print icon in the toolbar. If necessary, you can make changes to the page orientation in the Page Setup dialog box, and you can select Ink-saver mode, to save ink when printing.

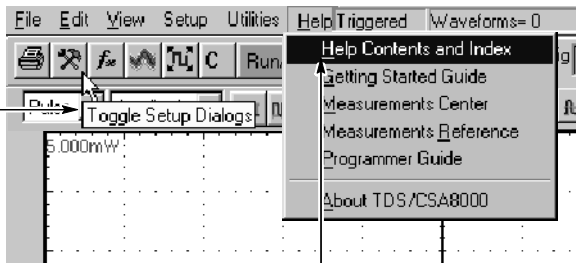


To copy a screen image into another application, choose the **Print to file** option in the print dialog. Save the screen image in a format that is compatible with your application, and then insert the screen image into your document.



# To Access the Help System

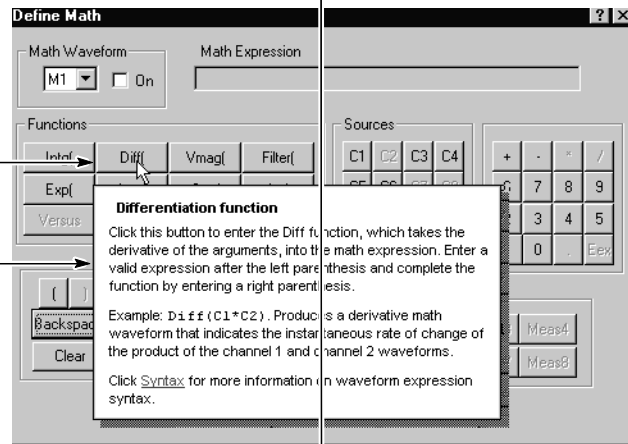
1 Tool tips automatically identify many screen controls when you point to them with the mouse.



2 Click the What's This? icon in the main window or the icon in a dialog box and then click on any screen element.

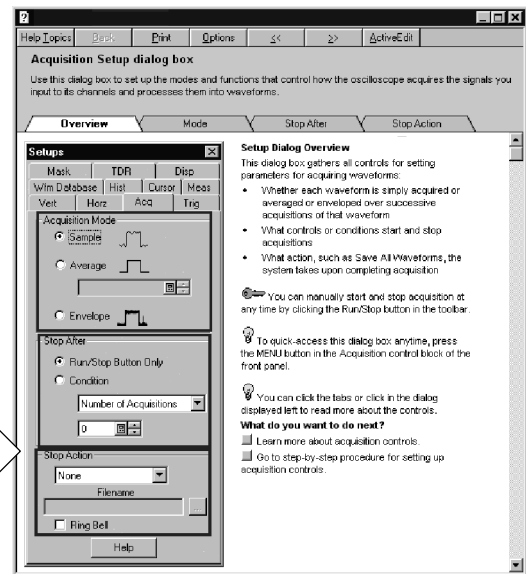
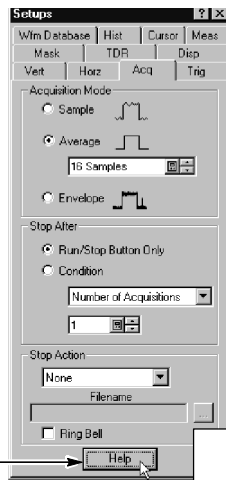
A small window appears that provides a brief description and sometimes links to additional information about the screen element.

You can also right click on an element in any setup dialog box to access What's This? help on that element.



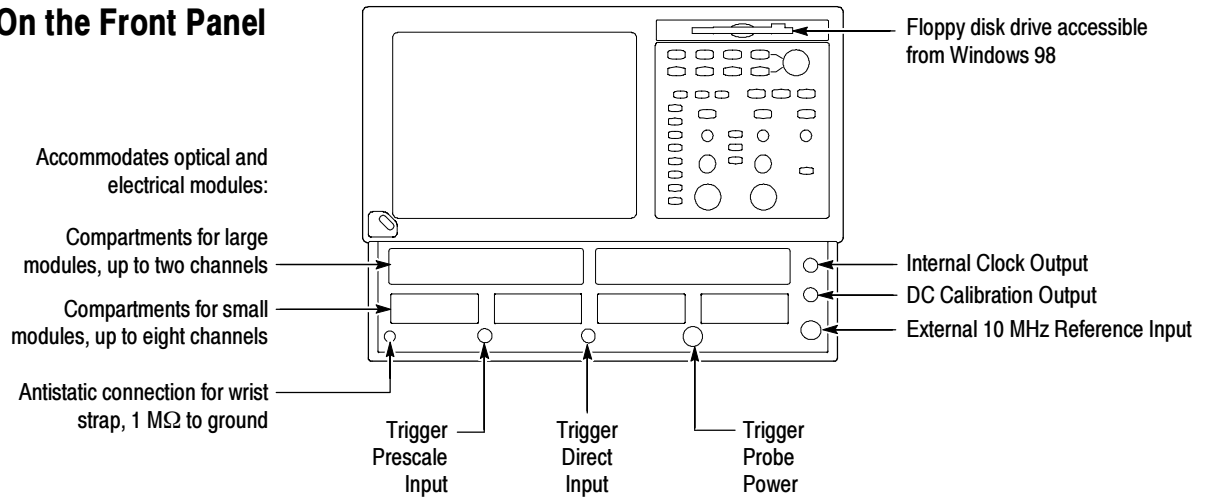
3 Click the Help menu in the UI application menu bar to access the Table of Contents and the Index of the help system. If you have a keyboard, you can enter keywords to search for a help topic.

4 Click the Help button in a setup dialog box to get help on that particular setup.



# To Use Instrument I/O

## On the Front Panel



## On the Rear Panel

